Original Article

Effectiveness of Triamcinolone Acetonide Injection for the Treatment of Non-infectious Intermediate and Posterior Uveitis

Iftikhar Ahmed[1*], Rashid Hassan Alvi[2], Maaz Allah[1], Sarah Saleem[1], Muhammad Nizamuddin[3]

ABSTRACT

OBJECTIVE: To assess the efficacy of posterior sub-tenon injection (PSTI) of Triamcinolone Acetonide (TA) in patients with Uveitis.

METHODS: This prospective study was conducted from July 2022 to May 2023. A total of 160 eyes were comprehensively examined at the Kulsoom Bai Valika Social Security Site Hospital and Sindh Government Qatar Hospital. Purposive sampling was employed for participant selection, focusing on the eye with poor vision in patients with Uveitis in both eyes. The sample was stratified into non-infectious posterior Uveitis and non-infectious intermediate Uveitis, maintaining a 1:1 ratio. Statistical analysis was performed using SPSS (version 25.0).

RESULTS: The median duration of Uveitis was 20.5 weeks (interquartile range, IQR: 17-25). The median best-corrected visual acuity before treatment was 0.5 (IQR: 0.4-0.7). After one week, it improved to 0.2 (IQR: 0.1-0.3), and after three months, it further increased to 0.12 (IQR: 0.1-0.18), showing a statistically significant difference (p-value < 0.01) between baseline and one week after treatment. The difference between one week and after 12 weeks remained consistent. Two-way analysis also revealed a significant difference (p-value < 0.01).

CONCLUSION: Posterior sub-tenon injection of triamcinolone acetonide is effective and safe for treating non-infectious Uveitis. The intraocular pressure did not show an increase following the injection, and visual acuity significantly improved after PSTI.

KEYWORDS: Triamcinolone Injection, Posterior Sub-Tenon's Injection, Non-Infectious, Intermediate Uveitis, Posterior Uveitis, Intraocular Pressure

INTRODUCTION

Uveitis can manifest as acute or chronic, and in developed countries, it stands as a significant cause of vision loss, with the potential for complete visual impairment. A study indicated that 10% of cases are associated with complete visual loss[1] Active-phase uveitis is often effectively treated with medications. In contrast, surgical or pharmacological interventions can manage complications such as cataracts and glaucoma associated with Uveitis[2]. Chronic Uveitis may lead to the formation of a secondary cataract, commonly a posterior subcapsular cataract, although anterior lens changes are also possible[3].

Uveitic glaucoma, primarily caused by the trabecular meshwork blockage due to inflammatory debris, has multiple underlying mechanisms. Cystoid macular edema (CME), common in intraocular inflammation, is often associated with vitreoretinal traction and vascular incompetence. Various types of anterior and posterior Uveitis can result in CME, which damages the blood-retina barrier and affects the macula[4].

In contrast to several methods of administering medicines, steroids administered via posterior subtenon injection (PSTI) are extensively utilized in posterior Uveitis and other ocular diseases. The widespread use of Triamcinolone acetonide (TA) intraocularly is due to its lack of toxicity in the eye[5]. PSTI has a sustained outcome achieved by the localized deposition of the medicine, resulting in fewer side effects[6]. Some studies have reported complications such as pain during injection, cataracts, and increased intraocular pressure (IOP) occurring frequently[7].

Ophthalmologists dealing with retinas often observe sudden vision loss in patients with macular edema, occurring with other ocular diseases such as Uveitis and diabetic retinopathy[8]. This administration route is absorbed from the back of the sclera into the eye, reducing the general side effects of oral steroids. A study reported using PSTI of TA for uveitis treatment[9]. In another article from India, intermediate Uveitis was

[1]*Department of Ophthalmology, Sindh Government Qatar Hospital, Banaras Bazar Chowk, Sector 8, Orangi Town, Karachi*
[2]*Kulsoom Bai Valika Social Security Site Hospital, Ashraf Nagar Paposh Nagar, Karachi*
[3]*Dow Institute of Medical Technology, Dow University of Health Sciences*
3rd Floor Nursing Building Dow University of Health Sciences (OJHA) near Mosamiyat Chowrangi, Karachi
***Correspondence:** Iftekharahmed011@gmail.com*
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reported in 7.8% of patients with Uveitis[10]. A research article from a developed country reported that cystoid macular edema was present in 40% of patients with Uveitis, and among them, 41% experienced vision deterioration, with complete vision loss occurring in 29% of patients[11]. PSTI of TA is frequently administered as a therapeutic agent in intermediate uveitis and cystoid macular edema. Compared therapeutically, the accumulation of TA in the macula is higher in PSTI than in intravitreal administration[12]. Therefore, the objective of this study is to evaluate the efficacy of posterior subtenon injection (PSTI) of Triamcinolone acetonide (TA) in patients with Uveitis.

METHODOLOGY

This prospective cohort study was conducted from July 2022 to May 2023 and received ethical approval from the committee. Approval was granted to enrol 160 eyes, thoroughly examined at Kulsoom Bai Valika Social Security Site Hospital and Sindh Government Qatar Hospital. The total number of patients included in the study was 100, selected through purposive sampling. In cases of Uveitis in both eyes, the eye with poor vision was included after obtaining informed consent from the patient or their guardian, with a thorough explanation of the study risks and benefits.

The sample was divided into two groups: non-infectious posterior Uveitis and non-infectious intermediate Uveitis, maintaining a 1:1 ratio. Diagnostic tests were conducted at the time of diagnosis to exclude infectious Uveitis. Assessments were performed at baseline, one week, four weeks, and twelve weeks after treatment administration.

All patients underwent various examinations, including measurement of best-corrected visual acuity (BCVA) using illuminated logMAR charts, measurement of intraocular pressure (IOP) using Goldmann applanation tonometry in both eyes and ophthalmic examinations including dilated ophthalmoscopy and slit-lamp examination for lens assessment. The grading of Uveitis was adopted by Standardization of Uveitis Nomenclature (SUN)[13]; the grading was done by a consultant during slit lamp examination. The patients with grades of 2+(moderate), 3+ (Marked) and 4+ (Intense) were included in the study (**Table I**)[14].

Table I:
Grading Scheme for Anterior Chamber Flare

Grade	Description
0	None
1+	Faint
2+	Moderate
3+	Marked
4+	Intense

Visual acuity was assessed using logarithmic visual acuity charts (logMAR) at three-time points: baseline, one week after treatment, and twelve weeks after treatment. Clinical assessment of macular edema involved a stereoscopic slit-lamp fundus examination.

Following topical anaesthesia, Triamcinolone acetonide 40mg/ml was injected using a 25-gauge needle in the supero-temporal quadrant[15]. The first post-injection follow-up occurred on the 7th day, and patients were monitored for at least three months.

Intraocular pressure (IOP) was measured using the Goldmann applanation tonometer before and one day after injection, and subsequently at one week, four weeks, and during follow-ups for a minimum of 3 months. Management strategies for elevated IOP were initiated based on the measured values, including topical anti-glaucoma medications and, in severe cases, general-route acetazolamide.

Exclusion criteria encompassed patients with BCVA less than 0.4 logMAR, immune-compromised individuals, and those with corneal pathologies, glaucoma, and ocular infections. Primary outcome measures were BCVA and IOP. Patients with Grade 1 Uveitis were excluded. The BCVA measured on three different occasions was compared to evaluate the effectiveness of the Triamcinolone acetonide. The decrease in logMAR will have a positive impact on the injection. During subsequent assessments, if the measured intraocular pressure (IOP) registered above 25 mmHg yet below 30 mmHg, the recommended intervention involved initiating a singular topical anti-glaucoma medication. In instances where the IOP surpassed 30 mmHg but remained below 35 mmHg or exceeded 35 mmHg but fell short of 40 mmHg, the prescribed course of action included the commencement of 2 or 3 topical anti-glaucoma medications, respectively. Should the IOP escalate beyond 40 mmHg, the prescribed treatment protocol encompassed the administration of 3 topical anti-glaucoma medicines in conjunction with oral acetazolamide. Qualitative variables were presented as frequency and percentages, while quantitative data were expressed as mean and standard deviation or median and IQR. The Shapiro-Wilk test assessed the normality of the data. Difference of BCVA at baseline, one week and after 12 weeks by Wilcoxon test. Friedman's two-way analysis evaluated the overall difference between the three BCVA. Statistical analysis was performed using SPSS (version 25.0), with a significance level set at $P < 0.05$.

RESULTS

A total of one hundred patients, contributing to one hundred and sixty eyes, were examined and included in this study. Of these, 80 eyes were categorized as having either posterior or intermediate Uveitis.

The median age of the patients was 43.5 years, with an interquartile range (IQR) of 20.5 to 61 years. We had a median (IQR) of 15 (10-17.5) weeks for the follow-up time. The median duration of Uveitis was 20.5 weeks, with an interquartile range (IQR) of 17 to 25 weeks (**Table II**). Most patients were graded as Marked 3+, 90 (43.8%).

Table II: Demographics of the uveitis patients

Characteristics:	Median (IQR)
Follow-up time	15(10-17.5) weeks
Age	43.5(20.5-61) years
Duration	20.5(17-25) weeks
Grading of Uveitis	
Moderate	60(37.5)
Marked	90(43.8)
Intense	30(18.8)

Before treatment, the best-corrected visual acuity (BCVA) had a median of 0.5, with an interquartile range (IQR) of 0.4-0.7. After one week of treatment, the BCVA median decreased to 0.2 (IQR: 0.1-0.3), and after three months, it further improved to 0.12 (IQR: 0.1-0.18). Statistical analysis revealed a significant difference (p-value < 0.01) when comparing the baseline to one week after treatment and one week after 12 weeks. The considerable difference persisted in a two-way analysis (p-value < 0.01). Please refer to **Table III** for detailed data.

TABLE III: Assessment of BCVA prior to and following a posterior sub-Tenon's injection triamcinolone

	Before treatment (baseline score)	1 week after the treatment	12 weeks after treatment	p-value (Before and 1 Week)	P-value (1 Week and 12 Week)	P-value
BCVA scores logMAR [Median (IQR)]	0.5 (0.4-0.7)	0.2 (0.1-0.3)	0.12 (0.1-0.18)	P < 0.001*	P < 0.001*	<0.001**

**Wilcoxon- ** Friedman's Two-way analysis of Variance*

No statistically significant difference was observed in intraocular pressure (IOP) before and after 12 weeks, as well as between 3 months and 18 weeks, with p-values greater than 0.05 for both comparisons. The median (IQR) of IOP at baseline was 19 (18-20); at 12 weeks, it remained 19 (18-20), and at 18 weeks it slightly increased to 20 (19-20). Refer to **Table IV** for detailed data.

Table IV: The treatment for intraocular pressure, following the drug administration

160 eyes	Baseline	12 weeks	18 weeks
mean IOP ± SD	19 (18-20)	19 (18-20)	20(19-20)
p-value (Wilcoxon)		>0.05	>0.05

Among the patients, 3 (2%) experienced an increase in intraocular pressure (IOP) exceeding 40, and this was addressed by administering three topical anti-glaucoma drops. Another three patients (2%) had an IOP increase above 30 but less than 35, and they were treated with two topical anti-glaucoma drops. Additionally, ten patients (6%) had an IOP rise beyond 25 but not exceeding 30, and they received treatment with one topical anti-glaucoma drop. Patients with IOP readings between 20 and 25 fell into the category of mild IOP elevation, comprising 13 patients (8%). Interestingly, this subgroup did not require any medication for IOP management (**Table V**).

Table V: Raised IOP of the Patients

IOP	n (%)	Anti-glaucoma medication
mild	13 (8%)	
rise of > 25 mmHg	10 (6%)	One topical Anti-glaucoma medication
rise of > 30 mmHg	3 (2%)	Two topical Anti-glaucoma medication
rise of > 40 mmHg	3 (2%)	Three topical Anti-glaucoma medication
Total	29(18%)	

DISCUSSION

In our research, a statistically significant difference was observed between the baseline best-corrected visual acuity (BCVA) and the BCVA at the 12th week after posterior sub-tenon triamcinolone acetonide injection. However, the intraocular pressure (IOP) showed no significant difference between baseline and 12 weeks after the injection. Consistent with our findings, previous studies have reported a statistically significant improvement in BCVA after sub-tenon triamcinolone acetonide injection, with no substantial effect on IOP[16-18].

Furthermore, our study indicated an enhancement in patients' vision within one week after the posterior sub-tenon injection (PSTI), aligning with findings from other studies[19-25]. Various studies have consistently supported the efficacy of triamcinolone acetate deposition for Uveitis therapy[26-28], especially in cases without infection, where corticosteroids are the predominant treatment[29-31].

In our study, the baseline median (IQR) visual acuity of 0.5 (0.4-0.7) improved to 0.2 (0.1-0.3) 1 week after PSTI and further to 0.12 (0.1-0.18) at 12 weeks, all showing statistically significant differences (p-value < 0.01). A study reported a similar enhancement in vision in 4 (14%) cases, indicating an improvement in visual acuity[32]. Multiple studies have consistently demonstrated improved visual acuity with PSTI TA treatment[20,33-35].

While some studies report increased intraocular pressure following PSTI, labelling it as a complication[36-38], our study did not find such an increase. The IOP remained relatively stable with a median (IQR) of 19 (18-20), 19 (18-20), and 20 (19-20) at baseline, 12 weeks, and 18 weeks, respectively, with a non-significant p-value (>0.05).

Similarly, other studies have reported consistent findings[16, 29].

CONCLUSION

The administration of posterior subtenon injection of triamcinolone acetonide is effective and does not pose significant risks for treating non-infectious Uveitis. There was no intraocular pressure (IOP) increase following the injection, indicating a lack of adverse impact on this aspect of ocular health. Moreover, the visual acuity significantly improved after the posterior subtenon injection, underscoring its positive effects on the patient's vision.

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AUTHOR CONTRIBUTION

Ahmed I: Principal investigator who conceived the idea for this study, authored and compiled the article.
Alvi RH: Played a supervisory role, offering expertise, and actively participated in data collection.
Allah M: Contributed to the literature review and participated in data collection for the study.
Saleem S: Assisted in the literature review and was involved in the data collection process.
Nizamuddin M: Conducted the data analysis and contributed to writing the results section of the article.

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